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Project description:

Background

The criteria normally used for discharging effluents are defined on the basis of standard techniques such as activated sludge and secondary clarification. However, it has become clear that in some cases specific effluent requirements are necessary. This applies in particular to water with a recreational function, ecologically sensitive waters or water that is to be re-used. In order to meet these requirements, the 4th Dutch National Policy Document on water management has defined certain standards, the so-called maximum tolerable risk (MTR) quality standards that cover both the present national and European Union criteria on the quality of surface water. In order to fulfil these strict criteria, the project envisaged the construction of a wastewater treatment plant (WWTP) based on the membrane bioreactor (MBR) technology. Seeking to attain the future MTR quality standards, the beneficiary, the Waterboard Rijn en IJssel, decided to experiment with the MBR technology and implement it in the Varsseveld WWTP that discharges its effluent into a small river serving as a regional ecological stepping stone.

Objectives

The project aimed to demonstrate the first full-scale application of MBR technology for treatment of municipal sewerage. This demonstration was a
necessary intermediate step between pilot plant research and large-scale application. It sought to prove that MBR technology can be applied in large-scale municipal sewerage treatment and successfully demonstrate its application. It also aimed to validate that effluent meets present and future water quality standards, and that MBR technology would enable both new and existing WWTPs to build very compact and modular technologies. Other expected results included the reduction of odour and noise emissions, and, eventually, the decrease of sludge production.

Results

This project is part of a comprehensive Dutch programme on membrane bioreactors (MBRs) and is a well-prepared initiative towards a first full-scale demonstration of a MBR for municipal wastewater in the Netherlands. It also has an important dissemination potential, given the rising attention to sensitive waters, the innovative aspects of the installation, the number of municipal WWTPs in the EU, and the active involvement of the project partners in EU sector organisations. The main project objective “to demonstrate the full-scale application of MBR technology for treatment of municipal sewerage” was fully met and the plant operates in a satisfactory way. The first 16 months’ operational results and experience with the Varsseveld MBR suggest that MBR technology is suitable for the treatment of municipal waste water in the Netherlands. The plant’s results have, in general, been very positive. Target values for permeate quality (2.2 mg Ntotal/l and 0.15 mg Ptotal/l) have been achieved and membrane function is excellent (apart from a few technical problems). The costs of the MBR are already comparable to those of a conventional plant with sand filtration, and the cost differential is now minimal with respect to energy consumption. Particularly innovative are the following aspects of the Varsseveld MBR installation: • Stringent pre-treatment using 0.8 mm microsieves (this has reportedly become the standard for new MBRs in Europe) • Application of separate membrane tanks • High automation of the plant and membrane cleaning processes • High variation in influent quantity that is specific to the Netherlands, and the high loads that are put through the membranes that can peak to 50 l/m²h (this is the highest of all European MBR installations) • High reduction percentages realised (97% COD, 93% total nitrogen and 99% total phosphorus) There is growing international interest in the technology. At project start, in 2002, some 20 smaller MBR installations were operational in Europe. By 2005 there were over 80 treating on average some 3,600 m³/day urban wastewater. The Varsseveld installation treats some 4,500 m³/day on average. The cost of setting-up the Varsseveld MBR was roughly comparable to that of expanding capacity with a conventional sand filtration plant. The utilisation costs (operational costs and capital charges) of the Varsseveld MBR are some 17% higher than those of the reference variant. This cost comparison suggests that the cost differential between an MBR and a conventional WWTP with sand filtration is relatively limited. Future developments (lower energy consumption, lower membrane prices) may lead to a further reduction in MBR utilisation costs. The environmental cost / benefit ratio for the MBR technology is specifically sound in highly urbanised areas with no or little spare room for enlargement of existing WWTPs, and for WWTPs that discharge on environmental or ecological sensitive waters. Finally, dissemination was particularly well done. The beneficiary and partners had a direct interest in
dissemination and thus created a wave of publicity around MBR developments in the Netherlands, both on a national and on an international level. The beneficiary organised a number of high profile events. For example, the Dutch Crown Prince Willem-Alexander officially opened the Varsseveld WWTP on 3 May 2005. This opening received high media attention (LIFEnews, Dutch television, local television, local newspapers, international press, CNN). This project has been awarded the title of "Best of the Best" from a shortlist of 22 "Best" LIFE Environment projects in 2006-2007

Environmental issues addressed:

Themes

Water - Waste water treatment

Keywords

waste water treatment

Target EU Legislation

- Water

Natura 2000 sites

Not applicable

Beneficiaries:

Coordinator: Waterschap Rijn en IJssel
Type of organisation: Public enterprise
Description: The beneficiary is the Rhine and IJssel Water Board located in the eastern part of the Netherlands. Partners are the Dutch Foundation for Applied Water Research (STOWA) and DHV, a leading international consultancy and engineering group with its HQ in the Netherlands.
Partners

Stowa, Netherlands DHV Water, Netherlands

Administrative data:

Project reference LIFE02 ENV/NL/000117
Duration 01-OCT-2002 to 30-JUN -2006
Total budget 8,055,070.71 €
EU contribution 1,584,694.52 €
Project location Gelderland(Nederland)

Read more:

Project web site Website of the project (NL, EN)
Publication: Book Title: "Membrane Bioreactors : Operation and Results of an MBR Wastewater Treatment Plant"
Publication: Layman report Title: Layman report Year: 2006 No of pages: 5
Video feature Title: Video feature of the project (16.3 MB)

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